MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

TIC 3151 – ARTIFICIAL INTELLIGENCE

(TC01)

14 OCTOBER 2019
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 7 pages with FOUR questions only.
2. Answer **ALL** questions.
3. Please write all your answers in the Answer Booklet provided.

QUESTION 1

(a) The Searle's *Chinese Room* experiment is a demonstration of *weak* and *strong* artificial intelligence (AI). Differentiate between *weak* and *strong* AI.

[4 marks]

(b) Figure 1 shows the architecture of a *Table-Driven* agent. Name the new agent type and describe the artificial intelligence technique that can support the ability to adapt to new environment.

[4 marks]

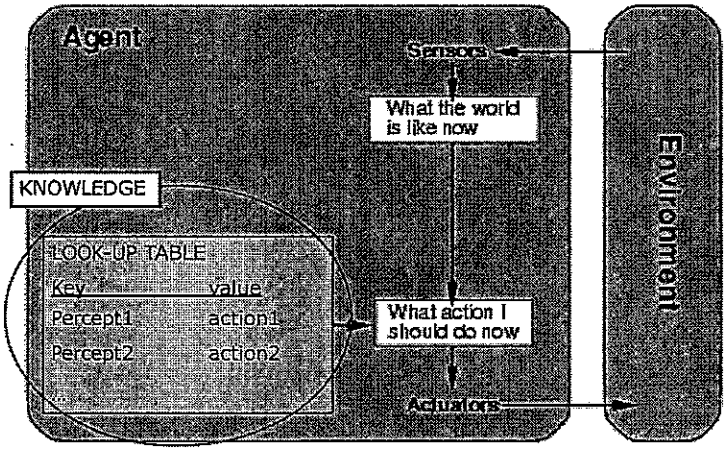

Figure 1: *Table-Driven Agent*

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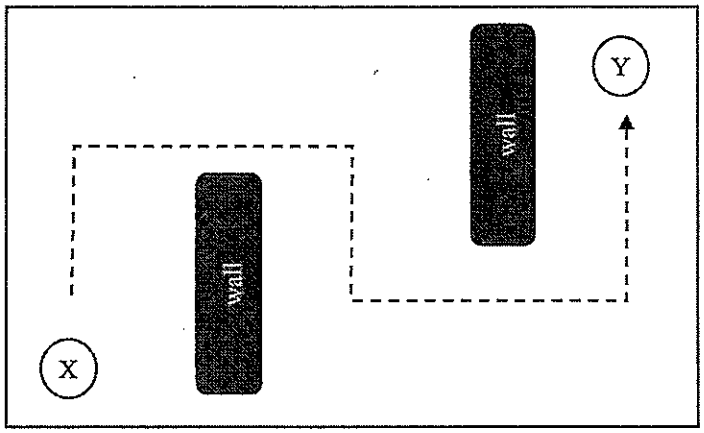
(c) The following diagram shows a robot's navigation path from point X to point Y. A robot is an agent that maps any given percept sequence, given by $f: p^* \rightarrow Ac$ where p^* is percept sequence and Ac is the corresponding action(s). The robot has the following information:

Sensor	Purpose	Usage
Ultrasonic	Measure distance	Avoid collision

Effector	Purpose	Usage
Motorized wheel	Move around	Turn right/left and move forward



Give ONE (1) example of *percept* and *action*.

[2 marks]

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QUESTION 2

(a) State TWO (2) characteristics of a domain with uncertainty which can be modeled using a Bayesian Network.

[2 marks]

(b) Detecting *Money Laundering* through financial transactions is difficult. Money Laundering can be inferred from two main components: (i) *suspicious demographic* profile, (i) *suspicious transaction* profile. Study the rules below carefully:

Suspicious demographic rules:

```
If age > 30 then Suspicious demographic = YES
If nationality = Malaysia then Suspicious demographic = NO
If salary < 15000 then Suspicious demographic = NO
```

Suspicious transaction rules:

```
If daily_amount > 50000 then Suspicious transaction = YES
If daily_frequency > 20 then Suspicious transaction = YES
If weekly_overseas_tx > 50 then Suspicious transaction = YES
```

Create a Bayesian Network based on the given information.

[5 marks]

(c) Based on your answer in Question 2(b), state ONE (1) *unobservable* node and ONE (1) *observable* node.

[2 marks]

(d) What is the purpose of Expectation Maximization in Bayesian Networks?

[1 mark]

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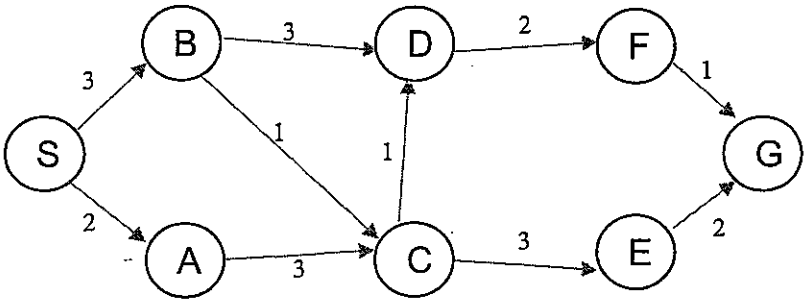
QUESTION 3

Please refer to the following graph for Question 3(a) and Question 3(b).

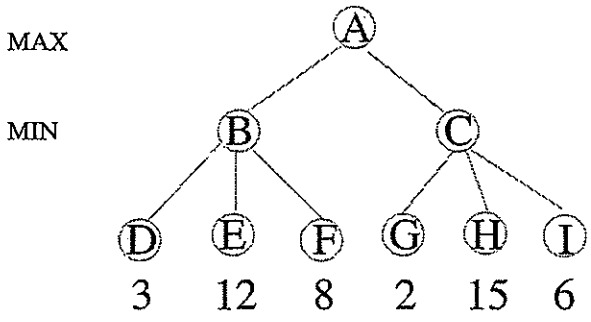


Node	h
S	6
A	4
B	4
C	4
D	3.5
E	1
F	1
G	0

(a) Perform A* algorithm and draw the search tree with start node S and end node G. Indicate the *f*-value for each node in the search tree.

[5 marks]

(b) Identify the nodes that will be pruned when *alpha-beta* pruning is applied to the game tree below.



[2 marks]

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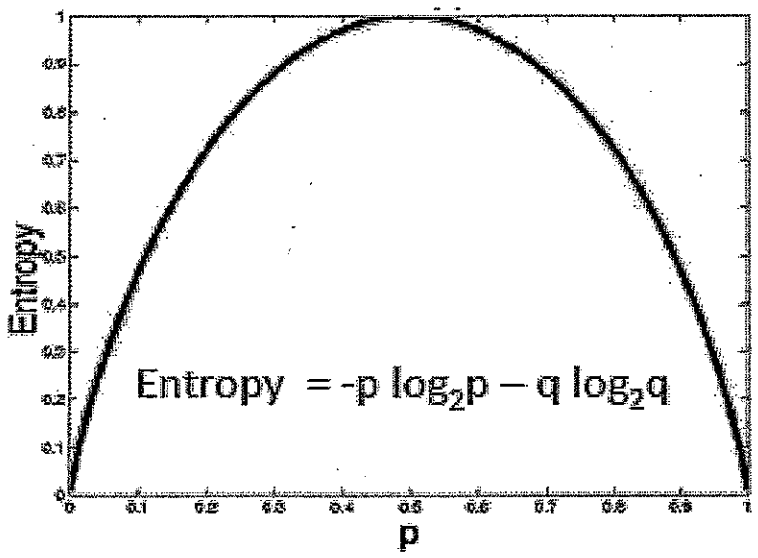
(c) A decision tree is built top-down from a root node and involves partitioning the data into subsets that contain instances with similar values (homogenous). Entropy is commonly used to calculate the homogeneity of a sample. Based the chart below, under what circumstances the entropy equals 0 and 1?



[3 marks]

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QUESTION 4

Study the following sentences in a Knowledge Base (KB) carefully before answering Question 4(a) and 4(b).

Ahmad stays in Denkile.
Those who stay in Denkile are good people.
Good people plant durian trees.

(a) Translate the above sentences into *first-order logic* sentences.

[3 marks]

(b) Convert the *first-order logic* sentences as in Question 4(a) into Conjunctive Normal Form (CNF) and apply resolution refutation to prove that the Knowledge Base (KB) can be used to infer

"*Ahmad plants durian trees.*"

[7 marks]

End of Pages.